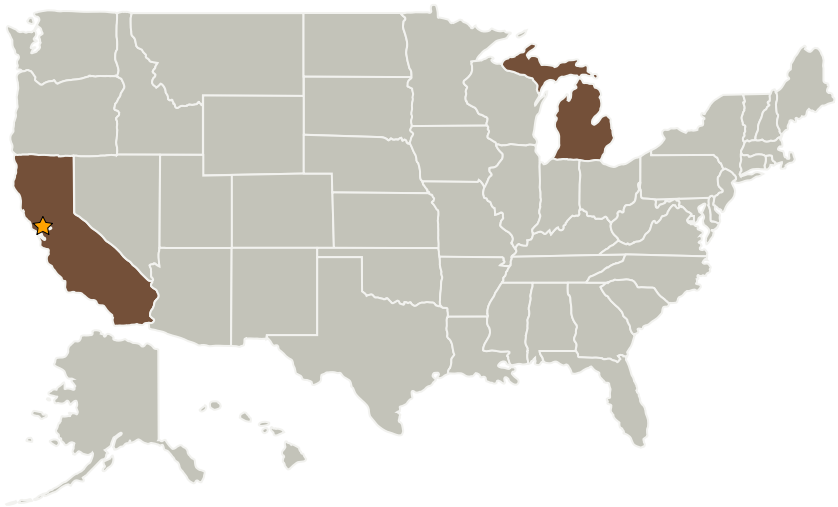
Data Mining for IVHM using Sparse Binary Ensembles, Phase I

Completed Technology Project (2008 - 2008)

Project Introduction

In response to NASA SBIR topic A1.05, "Data Mining for Integrated Vehicle Health Management", Michigan Aerospace Corporation (MAC) asserts that our unique SPADE (Sparse Processing Applied to Data Exploitation) technology meets a significant fraction of the stated criteria and has functionality that enables it to handle many applications within the aircraft lifecycle. SPADE distills input data into highly quantized features and uses MAC's novel techniques for constructing Ensembles of Decision Trees to develop extremely accurate diagnostic/prognostic models for classification, regression, clustering, anomaly detection and semi-supervised learning tasks. These techniques are currently being employed to do Threat Assessment for satellites in conjunction with researchers at the Air Force Research Lab. Significant advantages to this approach include: 1) completely data driven; 2) training and evaluation are faster than conventional methods; 3) operates effectively on huge datasets (> billion samples X > million features), 4) proven to be as accurate as state-of-the-art techniques in many significant real-world applications. The specific goals for Phase 1 will be to work with domain experts at NASA and with our partners Boeing, SpaceX and GMV Space Systems to delineate a subset of problems that are particularly well-suited to this approach and to determine requirements for deploying algorithms on platforms of opportunity.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Michigan Aerospace Corporation	Supporting Organization	Industry	Ann Arbor, Michigan

Primary U.S. Work Locations	
California	Michigan

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

John Trenkle

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.4 Information Processing
    - TX11.4.2 Intelligent Data Understanding